

Search query (7): [SP]: claims what is claimed is: 1. a bottom hole assembly comprising: a drill collar, and a power source, comprising: a dynamically adjustable swash plate, a dynamically adjustable variable displacement axial piston pump, and a drilling mud powered fluid turbine that drives an input shaft of the dynamically variable displacement axial piston pump. 2. the bottom hole assembly of claim 1, wherein the power source further comprises an axial piston pump actuator configured to control the angle of the swash plate. 3. the bottom hole assembly of claim 1, wherein the power source further comprises a charge pump configured to provide minimum flow to the dynamically variable displacement axial piston pump. 4. the bottom hole assembly of claim 1, wherein the power source further comprises a low pressure input line configured with a check valve and a pathway to a hydraulic reservoir through the check valve to provide additional fluid to the dynamically variable displacement axial piston pump. 5. the bottom hole assembly of claim 1, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic open loop circuit to regulate the variable power demanded by a load. 6. the bottom hole assembly of claim 1, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic closed loop circuit to regulate the variable power demanded by a load. 7. the bottom hole assembly of claim 1, further comprising: a microcontroller assembly comprising: a processor, a nonvolatile memory element, a program stored in the nonvolatile memory configured to control the amplitude of the power source output by changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump. 8. the bottom hole assembly of claim 7, further comprising a mud flow rate sensor configured to be in communication with the microcontroller assembly such that substantially realtime mud flow rate data is provided to the microcontroller assembly. 9. the bottom hole assembly of claim 8, wherein the microcontroller assembly further comprises a program stored in the nonvolatile memory configured to perform the steps of: receiving substantially realtime mud flow rate data from the mud flow rate sensor, controlling the amplitude of the power source output, and changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump in relation to the substantially realtime mud flow rate data received from the mud flow rate sensor. 10. the bottom hole assembly of claim 7, further comprising a revolution rate sensor configured to be in communication with the microcontroller assembly such that substantially realtime revolution data for the bottom hole assembly is provided to the microcontroller assembly. 11. the bottom hole assembly of claim 10, further comprising: a drill bit capable of axial deflection and a drill bit deflection amplitude sensor configured to be in communication with the microcontroller assembly such that substantially realtime drill bit deflection amplitude data is provided to the microcontroller. 12. the bottom hole assembly of claim 11, wherein the microcontroller assembly further comprises a program stored in the nonvolatile memory configured to perform the steps of: receiving substantially realtime revolution data from the revolution rate sensor, receiving substantially realtime drill bit deflection amplitude data from the drill bit deflection amplitude sensor, and controlling the amplitude of the power source output and changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump in relation to one or both of the substantially realtime revolution rate data and the substantially realtime drill bit deflection amplitude data. 13. a method of directional drilling well bore sections, comprising the step of deploying a bottom hole assembly comprising: a drill collar, and a power source, comprising: a dynamically adjustable swash plate, a dynamically variable displacement axial piston pump, and a drilling mud powered fluid turbine that drives an input shaft of the dynamically variable displacement axial piston pump. 14. the method of claim 13 further comprising the steps of: using a dynamically variable displacement axial piston pump to provide power to a downhole tool configured on the bottom hole assembly, and driving an input shaft of the dynamically variable displacement axial piston pump with a drilling mud powered fluid turbine. 15. the method of claim 13, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic open loop circuit to regulate the variable power demanded by a load. 16. the method of claim 13, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic closed loop circuit to regulate the variable power demanded by a load. 17. the method of claim 13 further comprising the step of controlling the amplitude of the power source output by changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump. 18. the method of claim 13 wherein the bottom hole assembly further comprises a microcontroller and a mud flow rate sensor, and the method further comprises the step of providing substantially realtime mud flow rate data to the microcontroller assembly. 19. the method of claim 18 further comprising the steps of: receiving substantially realtime mud flow rate data from the mud flow rate sensor, controlling the amplitude of the power source output, and changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump in relation to the substantially realtime mud flow rate data received from the mud flow rate sensor. 20. the method of claim 13 wherein the bottom hole assembly further comprises: a microcontroller assembly, a revolution rate sensor configured to be in communication with the microcontroller assembly such that substantially realtime revolution rate data for the bottom hole assembly is provided to the microcontroller assembly, a drill bit capable of axial deflection, and a drill bit deflection amplitude sensor configured to be in communication with the microcontroller assembly such that substantially realtime drill bit deflection amplitude data is provided to the microcontroller assembly. 21. the method according to claim 20 further comprising the steps of: receiving substantially realtime revolution rate data from the revolution rate sensor, receiving substantially realtime drill bit deflection amplitude data from the drill bit deflection amplitude sensor, controlling the amplitude of the power source output and changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump in relation to one or both of the substantially realtime revolution rate data and the substantially realtime drill bit deflection amplitude data. 22. a wireline conveyed tool comprising: a power source, comprising: a dynamically adjustable swash plate, a dynamically adjustable variable displacement axial piston pump, and a dynamically variable displacement axial piston pump. 23. the wireline conveyed tool of claim 22, wherein the power source further comprises an axial piston pump actuator configured to control the angle of the swash plate. 24. the wireline conveyed tool of claim 22, wherein the power source further comprises a charge pump configured to provide minimum flow to the dynamically variable displacement axial piston pump. 25. the wireline conveyed tool of claim 22, wherein the power source further comprises a low pressure input line configured with a check valve and a pathway to a hydraulic reservoir through the check valve to provide additional fluid to the dynamically variable displacement axial piston pump. 26. the wireline conveyed tool of claim 22, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic open loop circuit to regulate the variable power demanded by a load. 27. the wireline conveyed tool of claim 22, wherein the dynamically variable displacement axial piston pump is configured in a hydraulic closed loop circuit to regulate the variable power demanded by a load. 28. the wireline conveyed tool of claim 22, further comprising: a microcontroller assembly comprising: a processor, a nonvolatile memory element, a program stored in the nonvolatile memory configured to control the amplitude of the power source output by changing the angle of the dynamically adjustable swash plate of the dynamically variable displacement axial piston pump.

Results: 97

1) Family number: 66346072 (WO17119880A1)

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Title: DOWNHOLE POWER CONVERSION AND MANAGMENT USING A DYNAMICALLY ADJUSTABLE VARIABLE DISPLACEMENT PUMP

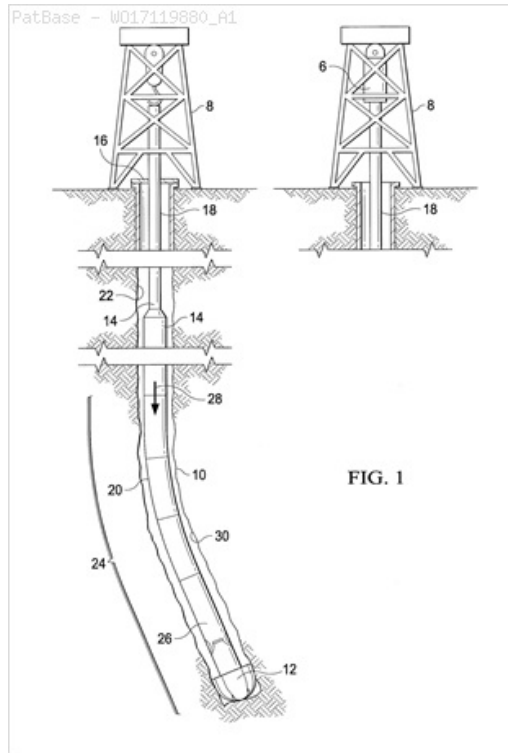
Abstract: A dynamically controllable variable displacement axial piston pump is described. In an embodiment, the pump comprises a rotating cylinder with hydraulic pistons that contact the face of a swash plate. The angle of the swash plate can be controlled to thereby control the movement of the pistons, the displacement of the pump, and the power generated by the pump. The dynamically controllable variable displacement axial piston pump may be used in combination with a rotary steerable apparatus, including such an apparatus as described herein that uses hydraulic pistons to actuate the deflection of the bit, or in combination with other downhole tools and devices. When used down hole in a drill string with a drilling mud powered turbine, the dynamically controllable variable displacement pump limits and regulates the power provided to the tool over a wide range of drilling mud weights and flow rates.

Classifications:

International (IPC 8-9): E21B7/04 (Advanced/Invention)

International (IPC 1-7): E21B7/04

CPC: E21B7/06

**Family:**

Publication number	Publication date	Application number	Application date
AU2016384580 AA	20180705	AU20160384580	20160106
BR112018013845 A2	20181218	BR20181113845	20160106
CA3009147 AA	20180619	CA20163009147	20160106
CN108431360 A	20180821	CN201680075488	20160106
CO20180007066 A2	20180719	CO20180007066	20180706
EA201891369 A1	20181130	EA20180091369	20160106
EP3400358 A1	20181114	EP20160884096	20160106
MX2018008274 A1	20180907	MX20180008274	20160106
WO17119880 A1	20170713	WO2016US12373	20160106

Priority:

WO2016US12373 20160106

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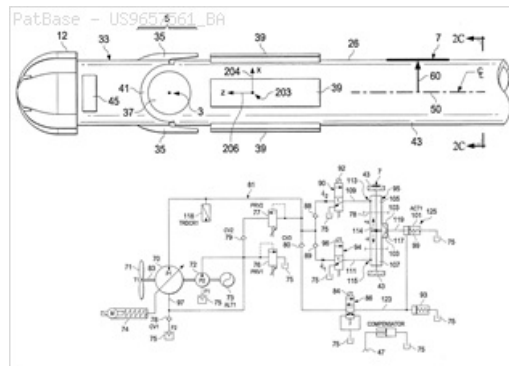
Title: DOWNHOLE POWER CONVERSION AND MANAGEMENT USING A DYNAMICALLY VARIABLE DISPLACEMENT PUMP

Abstract: A dynamically controllable variable displacement axial piston pump is described. In an embodiment, the pump comprises a rotating cylinder with hydraulic pistons that contact the face of a swash plate. The angle of the swash plate can be controlled to thereby control the movement of the pistons, the displacement of the pump, and the power generated by the pump. The dynamically controllable variable displacement axial piston pump may be used in combination with a rotary steerable apparatus, including such an apparatus as described herein that uses hydraulic pistons to actuate the deflection of the bit, or in combination with other downhole tools and devices. When used down hole in a drill string with a drilling mud powered turbine, the dynamically controllable variable displacement pump limits and regulates the power provided to the tool over a wide range of drilling mud weights and flow rates.

Classifications:**International (IPC 8-9):** E21B4/02 E21B44/00

E21B7/06 (Advanced/Invention)

CPC: E21B44/005 E21B4/02 E21B7/068 E21B4/006 E21B7/067

**Family:**

Publication number	Publication date	Application number	Application date
AR107060 AA	20180314	AR2016P103866	20161215
US9657561 BA	20170523	US20160989682	20160106

Priority:

US20160989682 20160106

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Title: STEERING ASSEMBLY FOR DIRECTIONAL DRILLING OF A WELLBORE

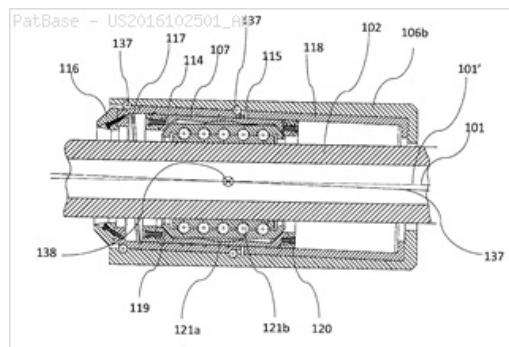
Abstract: A steering assembly includes a housing having a longitudinal axis, a mandrel having a front connecting extremity and a rear connecting extremity, the mandrel passing through the housing and arranged in a first position coaxially to the longitudinal axis of the housing, a deflector device configured to exert a side force on the mandrel to offset the front connecting extremity of the mandrel from the longitudinal axis, and a tool face assembly configured to rotate the front connecting extremity of the mandrel in a desired direction.

Classifications:

International (IPC 8-9): E21B10/00 E21B17/10 E21B44/00 E21B44/02 E21B47/024 E21B49/00 E21B7/06 E21B7/08 (Advanced/Invention)

CPC: E21B7/061 E21B17/1078 E21B44/005 E21B47/024 E21B7/062 E21B7/064 E21B7/06 E21B7/067 E21B17/1014

US: 1/1 175/24 175/61 175/74 175/75

**Family:**

Publication number	Publication date	Application number	Application date
CA2991486 AA	20180105	CA20152991486	20151006
CN107429543 A	20171201	CN201580067283	20151006
GB201707285 A0	20170621	GB20170007285	20151006
GB2547151 A1	20170809	GB20170007285	20151006
GB2547151 B2	20190410	GB20170007285	20151006
ID201803080 A	20180323	ID2017P0002950	20151006
MX2017004486 A1	20180706	MX20170004486	20151006
RU2017115928 A	20181113	RU20170115928	20151006
RU2017115928 A3	20190419	RU20170115928	20151006
US2016102501 AA	20160414	US20150797623	20150713
US9109402 BA	20150818	US20140510561	20141009
US10253567 BB	20190409	US20150797623	20150713
WO16057445 A1	20160414	WO2015US54119	20151006

Priority:

US20140510561 20141009 RU20170115928 20150006 US20150797623 20150713
 RU20170115928 20151006 WO2015US54119 20151006

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Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

4) Family number: 59938221 (US2015211396A)

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Title: LUBRICATING OIL SUPPLY STRUCTURE

Abstract: A housing supporting a rotational shaft and accommodating an axial piston member is provided with an oil reservoir space that faces at least one of the two end faces in the axial direction of the rotational shaft. The rotational shaft is provided with a rotational-shaft-side supply oil passage that includes an axial hole open to the oil reservoir space and an axial-piston-member lubricating oil hole having one end fluidly connected to the axial hole and the other end open to a portion of the external surface of the first rotational shaft that faces the axial piston member.

Classifications:

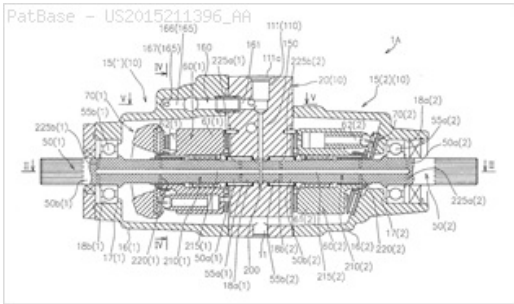
International (IPC 8-9): F01M11/02 F04B1/22 F04B53/18 F16H57/04 (Advanced/Invention)

CPC: F01M11/02 F01B3/02 F04B1/22 F04B29/00

US: 92/153

JP F-Term: 3H070 3H070/AA01 3H070/BB04 3H070/CC27 3H070/DD02 3H070/DD13 3H070/DD93 3H071 3H071/AA03 3H071/BB01 3H071/CC27 3H071/DD01 3H071/DD06 3H071/DD45

JP F-Index: F04B1/22 F04B21/00/A F04B53/18



Family:

Publication number	Publication date	Application number	Application date
CN104806738 A	20150729	CN201510025506	20150119
JP2015140694 A2	20150803	JP20140012881	20140128
JP6330130 B2	20180530	JP20140012881	20140128
US2015211396 AA	20150730	US20150603896	20150123

Priority:

JP20140012881 20140128

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5) Family number: 58506678 (US2015050165A)

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Title: CONTROL UNIT FOR HYDRAULIC VARIABLE DISPLACEMENT PUMPS AND VARIABLE DISPLACEMENT PUMP WITH A CONTROL UNIT

Abstract: Control device for hydraulic variable displacement pumps operated in an open hydraulic circuit and adjustable in their displacement volume by means of a servo control device. The control device comprises a control piston with two control edges to which pressure can be applied by means of pressurized pressure fluid from a variable displacement pump, the control piston being mounted in a housing so that it shifts longitudinally. The housing of the control piston comprises an inlet for the connection of a high pressure line of a variable displacement pump, an outlet which can be connected to a tank and a servo connection which can be linked to a servo cylinder, whereby a link between the inlet and the servo connection can be made via a first control edge. It is possible to create a link between the servo connection and the outlet via a second control edge.

Classifications:

International (IPC 8-9): F04B1/32 F04B49/00 F04B49/08 F04B49/12 (Advanced/Invention)

CPC: F04B49/08 F04B1/324 F04B49/002 F04B49/12 Y10T137/86622

US: 417/270

Publication number	Publication date	Application number	Application date
CN104421123 A	20150318	CN201410403725	20140815
CN104421123 B	20181012	CN201410403725	20140815
DE102013216395 A1	20150219	DE201310216395	20130819
DE102013216395 B4	20190117	DE201310216395	20130819
US2015050165 AA	20150219	US20140452112	20140805
US10309390 BB	20190604	US20140452112	20140805

DE201310216395 20130819

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Assignee(s): DANFOSS POWER SOLUTIONS AS

Inventor(s): (std): SMOLKA STANISLOV ; MORCA STANISLAV ; SMOLKA STANISLAV ; ZAVADINKA PETER ; SEDO PAVOL

Agent(s): ZARLEY LAW FIRM PLC

Title: DIRECTIONAL DRILLING SYSTEM

Abstract: A technique facilitates drilling of wellbores or other types of bore holes in a variety of applications. A steerable system or other well tool is designed with a plurality of actuators which are positioned to provide controlled steering during a drilling operation. Each actuator includes at least one loose element or ball slidably mounted in a corresponding sleeve. Pressurized fluid is used to provide controlled movement of the elements along the corresponding sleeves of the actuators. The controlled movement of the elements assists in the provision of steering or other control over the well tool during the drilling operation.

Classifications:

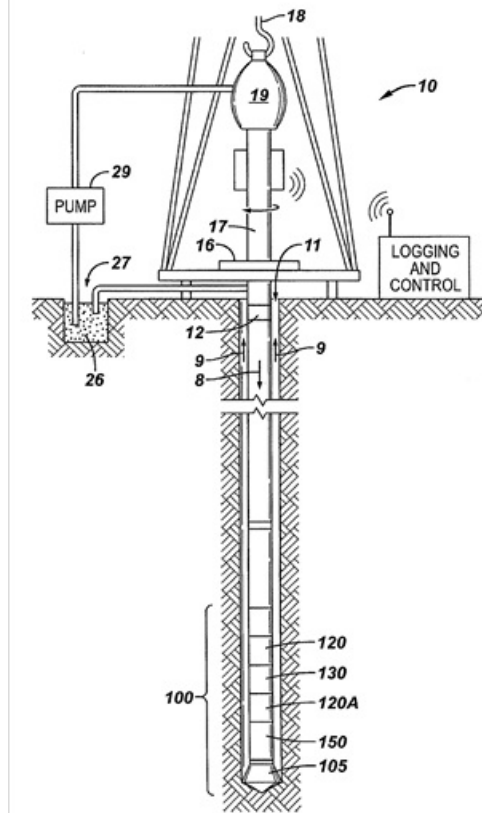
International (IPC 8-9): E21B21/10 E21B4/02 E21B44/06 E21B7/04

E21B7/06 (Advanced/Invention)

International (IPC 1-7): E21B21/10 E21B4/02 E21B44/06

CPC: E21B7/04 E21B7/06

US: 1/1 175/61 175/73

**Family:**

Publication number	Publication date	Application number	Application date
AU2013277645 AA	20131227	AU20130277645	20130520
AU2013277645 BB	20151217	AU20130277645	20130520
BR112014028708 A2	20171024	BR20141128708	20130520
CA2872537 AA	20141103	CA20132872537	20130520
CN104428481 A	20150318	CN201380032373	20130520
CN104428481 B	20180216	CN201380032373	20130520
EA201590060 A1	20150430	EA20150090060	20130520
EP2864570 A1	20150429	EP20130806174	20130520
EP2864570 A4	20160727	EP20130806174	20130520
MX2014014490 A1	20150224	MX20140014490	20130520
SG11201407118R A1	20141127	SG20141107118	20130520
US2013341098 AA	20131226	US20120529997	20120621
US9057223 BB	20150616	US20120529997	20120621
WO13191838 A1	20131227	WO2013US41787	20130520

Priority:

US20120529997 20120621 WO2013US41787 20130520

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): BOGATH CHRISTOPHER C ; CRERAR PAUL ; DOWNTON GEOFFREY C ; LACOUR BERTRAND ; PERRIN CEDRIC ; SCHLUMBERGER HOLDINGS ; PRAD RES AND DEV LTD ; SCHLUMBERGER CA LTD ; SCHLUMBERGER TECHNOLOGY BV ; SERVICES PETROLIERS SCHLUMBERGER ; SCHLUMBERGER TECHNOLOGY CORP ; SCHLUMBERGER SERVICES PETROL ; SCHLUMBERGER TECH BV

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Inventor(s): CHRISTOPHER BOGATH ; LACOUR BERTRANDFR ; CRERAR PAULGB ; PERRIN CEDRICFR ; DOWNTON GEOFFREY CGB ; BOGATH CHRISTOPHER CGB

Agent(s): GRIFFITH HACK; SMART AND BIGGAR; LI BOXI; CHADWICK A; WESLEY; SULLIVAN CHADWICK A ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Title: MODULAR ROTARY STEERABLE ACTUATORS, STEERING TOOLS, AND ROTARY STEERABLE DRILLING SYSTEMS WITH MODULAR ACTUATORS

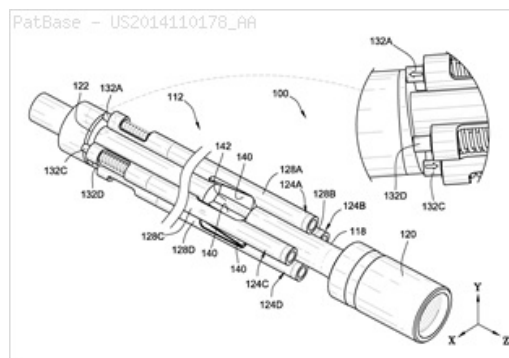
Abstract: Modular actuators, steering tools, and rotary steerable drilling systems are presented herein. A modular actuator is disclosed for use in directing a drill string, which includes a housing proximate a drive shaft. The modular actuator includes a cartridge that is configured to couple to the outer periphery of the housing. A fluid reservoir is contained within the cartridge. A hydraulically actuated actuator piston, which is slidably disposed at least partially inside the cartridge, is movable between activated and deactivated positions. A hydraulic control system is also contained within the cartridge, fluidly coupling the fluid reservoir to the actuator piston. The hydraulic control system is configured to regulate movement of the actuator piston between the activated and deactivated positions such that the actuator piston selectively presses against and moves the drive shaft and thereby changes the direction of the drill string.

Classifications:

International (IPC 8-9): E21B19/18 E21B4/02 E21B47/02 E21B7/04 E21B7/06 E21B7/08 (Advanced/Invention)

CPC: E21B7/06 E21B4/02 E21B7/04 E21B47/02 E21B7/062

US: 175/61 175/73 175/76



Family:

Publication number	Publication date	Application number	Application date
AU2012382465 AA	20131219	AU20120382465	20120612
AU2012382465 BB	20151210	AU20120382465	20120612
BR112014031031 A2	20170627	BR20141131031	20120612
CA2876375 AA	20141211	CA20122876375	20120612
CA2876375 C	20160816	CA20122876375	20120612
CN104619944 A	20150513	CN201280073929	20120612
CN104619944 B	20160928	CN201280073929	20120612
EP2859171 A1	20150415	EP20120879071	20120612
EP2859171 A4	20160907	EP20120879071	20120612
EP2859171 B1	20190313	EP20120879071	20120612
IN10389DN2014 A	20150814	IN2014DN10389	20141205
RU2014151006 A	20160727	RU20140151006	20120612
RU2598671 C2	20160927	RU20140151006	20120612
US2014110178 AA	20140424	US20120007192	20120612
US9016401 BB	20150428	US20120007192	20120612
WO13187885 A1	20131219	WO2012US42069	20120612

Priority:

US20120007192 20120612 WO2012US42069 20120612

Probable Assignee: HALLIBURTON CO

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Inventor(s): SAVAGE JOHN KEITH712-173 ST. SWEDMONTONA1T6W 0M4CA ; KIRKHOPE KENNEDY JOHN844 SOUTH PARK GREENLEDUCA1T9E 0P4CA

Agent(s): PIZZEYS; PHILLIPS ORMONDE FITZPATRICK; PARLEE MCLAWS LLP; BENNETT ADRIAN ROBERT J; CHAMBERLAIN; KITCH PAUL ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

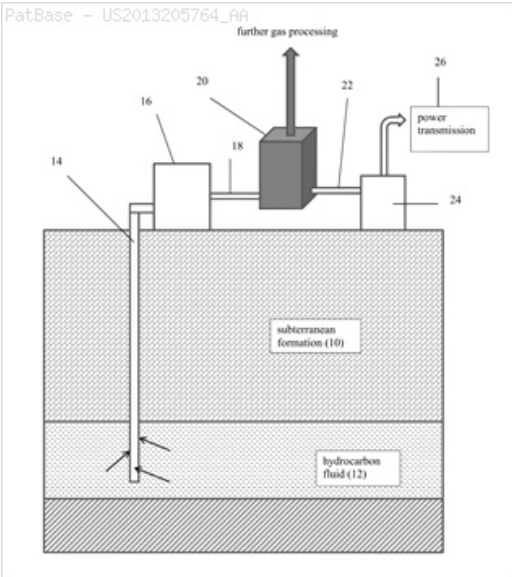
Title: KINETIC ENERGY TRANSFER SYSTEM AND METHODS

Abstract: Systems, methods and apparatus for subjecting high-pressure fluids to a fluid flow assembly that generates or extracts work/energy using a work producing machine. Kinetic energy from the work producing machine is converted to electricity using a generator or similar apparatus.

Classifications:

International (IPC 8-9): F01D15/10 F03G7/04 H02K7/18 (Advanced/Invention)

CPC: Y02B10/30 F01D15/10 H02K7/1823 F03G7/04



Family:

Publication number	Publication date	Application number	Application date
US2013205764 AA	20130815	US20130766766	20130213
US2016108752 AA	20160421	US20150977111	20151221
US9217422 BB	20151222	US20130766766	20130213

Priority:

US20120598152P 20120213 US20130766766 20130213 US20150977111 20151221

Probable Assignee: DAVIS LUD

Assignee(s): (std): DAVIS LUD

Inventor(s): (std): DAVIS LUD

Agent(s): SUTTON MCAUGHAN DEEVER PLLC

9) Family number: 53770670 (US2013129460A)

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Title: WORK IMPLEMENT CONTROL SYSTEM

Abstract: A control system for a work implement on a machine is disclosed including a first hydraulic circuit, a second hydraulic circuit, and a controller. The first hydraulic circuit includes a hydraulic cylinder assembly, a pressurized fluid source, and a fluid tank. The hydraulic cylinder assembly includes a head end, a rod end, a cylinder, and a rod. The pressurized fluid source and the fluid tank are selectively connected to the head end or the rod end. The second hydraulic circuit includes a valve configured to receive a connection to tank signal and selectively connect the head end or the rod end to the fluid tank. The controller is configured to generate the connection to tank signal.

Classifications:

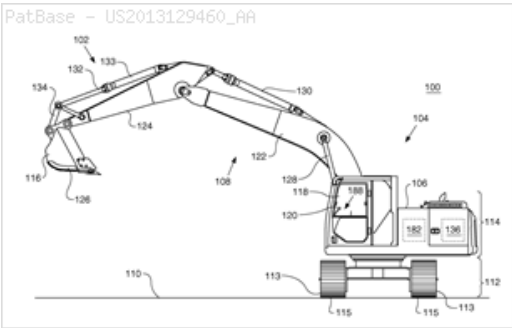
International (IPC 8-9): E02F1/00 E02F3/36 E02F9/08 E02F9/20 E02F9/22 F15B11/028 F15B11/044 F15B13/02 F15B21/08 (Advanced/Invention)

CPC: E02F9/0883 E02F9/2029 E02F9/2095 E02F9/2203 E02F9/2217 F15B11/044 F15B2211/3052 F15B2211/30565 F15B2211/31558 F15B2211/353 F15B2211/6313 F15B2211/665 F15B2211/7053 F15B2211/761

US: 1/1 414/699 414/815 60/327 60/459

JP F-Term: 2D003 2D003/AA01 2D003/AB04 2D003/BB01 2D003/CA02 2D003/DA04 2D003/DB02 2D003/FA02 3H089 3H089/AA20 3H089/AA32 3H089/BB14 3H089/BB15 3H089/CC01 3H089/DA02 3H089/DB33 3H089/DB37 3H089/DB43 3H089/DB54 3H089/EE36 3H089/FF02 3H089/FF07 3H089/FF12 3H089/GG02 3H089/JJ02

JP F-Index: E02F9/22/E F15B11/02/X F15B11/028/G



Family:

Publication number	Publication date	Application number	Application date
CN104053912 A	20140917	CN201280067104	20121030
CN104053912 B	20170725	CN201280067104	20121030
DE112012004854 T5	20140821	DE201211004854T	20121030
JP2014534399 T2	20141218	JP20140543477T	20121030
US2013129460 AA	20130523	US20110302254	20111122
US9169620 BB	20151027	US20110302254	20111122
WO13077968 A1	20130530	WO2012US62522	20121030

Priority:

US20110302254 20111122 WO2012US62522 20121030

Probable Assignee: CATERPILLAR INC

Assignee(s): (std): CATERPILLAR INC ; GABIBULAYEV MAGOMED O
Inventor(s): (std): GABIBULAYEV MAGOMED O
Agent(s): TANI AND ABE PC; BAKERHOSTETLER; FAHLBERG ROBIN S ET AL
Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

10) Family number: 53291724 (US2013075164A)

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Title: POINT THE BIT ROTARY STEERABLE SYSTEM

Abstract: A method, device, and system is described herein for pointing a rotary drill bit. A rotary bit pointing device is positioned between a proximal end of a control shaft and a universal joint. As the bottom hole assembly rotates, various portions of the rotary bit pointing device are enabled and subsequently disabled to apply a substantially constant force in a substantially constant direction to the control shaft. Such a force causes the distal end of the control shaft to point the rotary drill bit in a target direction.

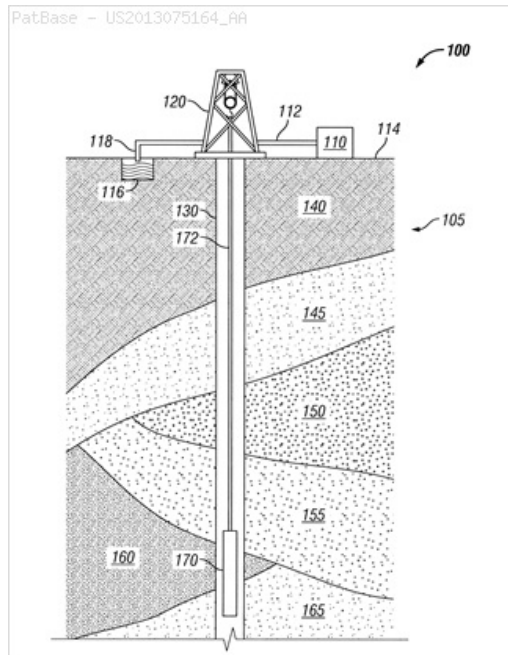
Classifications:

International (IPC 8-9): E21B44/00 E21B7/06

E21B7/08 (Advanced/Invention)

CPC: E21B7/06 E21B7/067

US: 1/1 175/61 175/73



Family:

Publication number	Publication date	Application number	Application date
CA2850018 AA	20140325	CA20122850018	20120927
US2013075164 AA	20130328	US20120628332	20120927
US9187956 BB	20151117	US20120628332	20120927
WO13046028 A2	20130404	WO2012IB02313	20120927
WO13046028 A3	20140508	WO2012IB02313	20120927

Priority:

US20110539554P 20110927 US20120628332 20120927 WO2012IB02313 20120927

Probable Assignee: HUTTON RICHARD

Assignee(s): (std): HUTTON RICHARD ; RUTLAND JEFF

Assignee(s): RUTLAND JEFF24 KEITH GROVEW12 9EZLONDONGB ; HUTTON RICHARD21 MONTROSE AVENUEREDLANDBS6 6EHBRISTOLGB

Inventor(s): (std): HUTTON RICHARD ; RUTLAND JEFF

Inventor(s): HUTTON RICHARD21 MONTROSE AVENUEREDLANDBS6 6EHBRISTOLGB ; RUTLAND JEFF24 KEITH GROVEW12 9EZLONDONGB

Agent(s): SMART AND BIGGAR; KING AND SPALDING LLP

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

11) Family number: 53272257 (US2013068463A)

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Title: FLUID SAMPLE CLEANUP

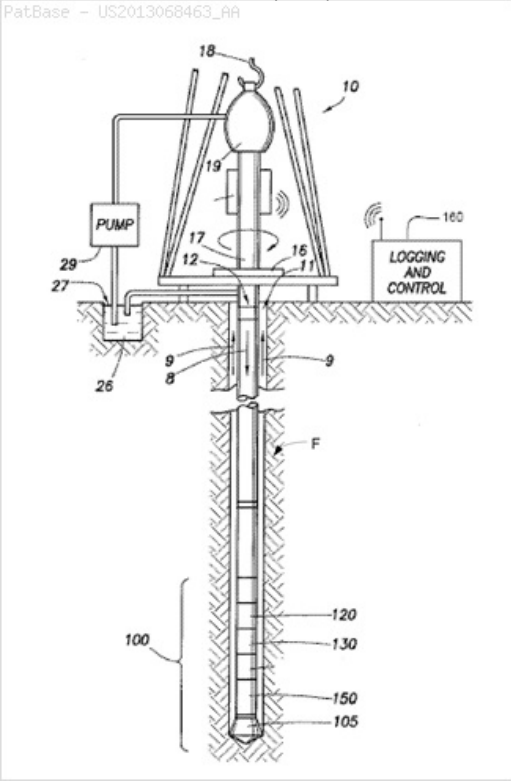
Abstract: An apparatus having a body including a plurality of packers and a plurality of ports between the packers. The packers and ports are spaced along a longitudinal axis of the body. The apparatus also includes a control module to obtain a density of a formation fluid and, based on the density, determine a direction to pump fluid from an interval defined by the packers.

Classifications:

International (IPC 8-9): E21B33/12 E21B33/124 E21B37/00 E21B37/02 E21B47/00 E21B49/08 (Advanced/Invention)

CPC: E21B33/1243 E21B49/081

US: 166/188 166/191 166/250.17 166/264 166/311



Family:

Publication number	Publication date	Application number	Application date
BR112014006670 A2	20170404	BR20141106670	20120920
CA2849144 AA	20140318	CA20122849144	20120920
EP2742209 A1	20140618	EP20120833586	20120920
EP2742209 A4	20160120	EP20120833586	20120920
MX2014003307 A1	20140709	MX20140003307	20120920
US2013068463 AA	20130321	US20110237214	20110920
US8905130 BB	20141209	US20110237214	20110920
WO13043836 A1	20130328	WO2012US56277	20120920

Priority:

US20110237214 20110920 WO2012US56277 20120920

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): LANDSIEDEL NATHAN ; PRAD RES AND DEV LTD ; SCHLUMBERGER SERVICES PETROL ; SCHLUMBERGER HOLDINGS ; SCHLUMBERGER CA LTD ; SCHLUMBERGER TECHNOLOGY CORP ; SERVICES PETROLIERS SCHLUMBERGER ; SCHLUMBERGER TECHNOLOGY BV

Assignee(s): SCHLUMBERGER HOLDINGS LIMITED ; SCHLUMBERGER CANADA LIMITED ; SCHLUMBERGER TECHNOLOGY B V ; PRAD RESEARCH AND DEVELOPMENT LIMITED ; PRAD RESEARCH AND DEVELOPMENT LTD ; SCHLUMBERGER HOLDINGS LTD ; SCHLUMBERGER CANADA LTD

Inventor(s): (std): LANDSIEDEL NATHAN ; NATHAN LANDSIEDEL

Agent(s): SMART AND BIGGAR; FORD MICHAEL FREDERICK; KENNETH; CATHY; HEWITT CATHY ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

12) Family number: 50661376 (US2012043133A)

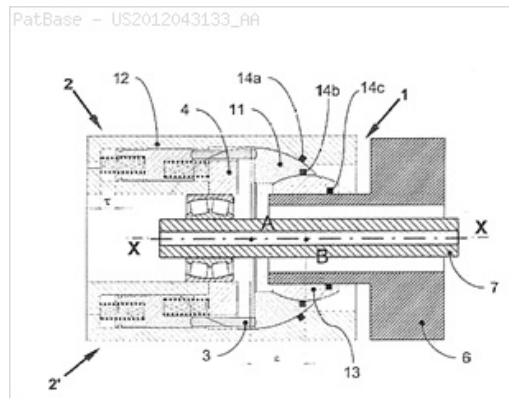
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Title: ANNULAR DEVICE FOR RADIAL DISPLACEMENTS OF INTERCONNECTED PARTS

Abstract: The invention relates to a device for generating essentially radial displacements and/or stresses of at least one mechanical part with respect to its X-X axis common with that of at least one other mechanical part functionally connected to the first one, said device comprising: (I) a frame, a swivelling ring (11) and an internal ring producing two nested ball joint connections (a) and (b) with respective centres A and B, eccentric by a distance or value e along said X-X axis common to the two rings in a position said to be neutral, (II) one or more actuators in a barrel arrangement about the X-X axis for driving the mechanism, each actuator acting on the swivelling ring (11) via a guided push rod (3), and (III) a guide ring (4) for guiding the push rods (3) via a bidirectional planar link (e), while the swivelling rings (11, 13) are steerable by means of push rods (3) displaced by the actuators (2) and guided by the guide ring (4), and while said swivelling rings are rotatable in their respective housings (a) and (b), Application in particular for drilling trajectory control devices.

Classifications:

International (IPC 8-9): E21B17/03 E21B4/00 E21B7/00 E21B7/04
E21B7/06 E21B7/08 E21B7/24 (Advanced/Invention)
CPC: E21B7/067
European: E21B7/06K
US: 1/1 175/55 175/55P 175/73 175/73S



Family:

Publication number	Publication date	Application number	Application date
EA201101106 A1	20120430	EA20110001106	20110819
FR2963945 A1	20120224	FR20100003406	20100820
FR2963945 B1	20130510	FR20100003406	20100820
PL396022 A1	20120227	PL20110396022	20110819
US2012043133 AA	20120223	US20110212911	20110818
US9091122 BB	20150728	US20110212911	20110818

Priority:

FR20100003406 20100820

Probable Assignee: BREAKTHROUGH DESIGN

Assignee(s): (std): BREAKTHROUGH DESIGN ; MILLET FRANCOIS

Inventor(s): (std): MILLET FRANCOIS GUY JACQUES RENE ; MILLET FRANCOIS

Inventor(s): FRANCOIS GUY JACQUES RENE MILLET

Agent(s): CABINET LEBOYER; LARSON AND ANDERSON LLC

13) Family number: 49698313 (US2011240368A)

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Title: BENDING OF A SHAFT OF A STEERABLE BOREHOLE DRILLING TOOL

Abstract: In certain embodiments, a steerable drilling tool is provided including a rotatable shaft extending through a housing where the shaft and the housing are separated by at least one bearing or two sets of bearings, the shaft having a first portion terminating at a first end of the shaft and a second portion terminating at a second end of the shaft. The steerable drilling tool may further include a drill bit structure operatively coupled to the first portion and a steering subsystem comprising a pair of bearings operatively coupled to the first portion. The steering subsystem may be configured to angulate the shaft by exerting force substantially through the pair of bearings. In certain embodiments, the first portion is between the first end and about one-third of the length of the shaft from the first end towards the second end.

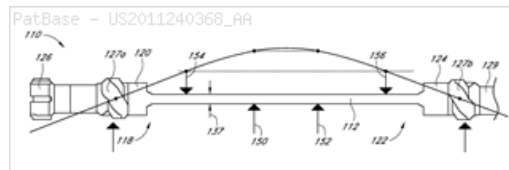
Classifications:

International (IPC 8-9): E21B7/04 E21B7/06 (Advanced/Invention)

CPC: E21B7/062

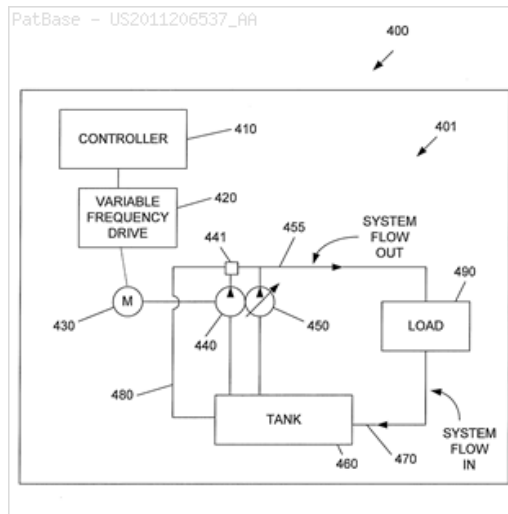
European: E21B7/06C

US: 175/26 175/61 175/61P 175/73 175/73S



Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Abstract: A hydraulic power device for effecting operation of at least one load, the hydraulic power device including a motor having a predetermined motor speed rating and motor power rating, at least one pump operably coupled to the motor, the pump being configured to provide, to the at least one load, a predetermined hydraulic fluid flow at the predetermined motor speed rating, and a variable frequency drive connected to the motor, the variable frequency drive being configured to effect operation of the motor at a speed above the predetermined motor speed rating such that the at least one pump operates to provide an excess hydraulic fluid flow during operation of the motor substantially above the predetermined motor speed rating where the excess fluid flow is greater than the predetermined hydraulic fluid flow.

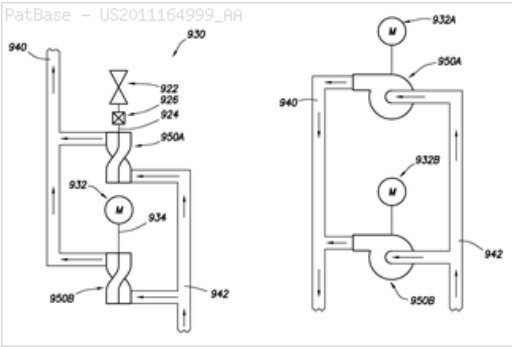


Publication number	Publication date	Application number	Application date
US2011206537 AA	20110825	US20100711576	20100224
US8801407 BB	20140812	US20100711576	20100224
WO11106503 A1	20110901	WO2011US26041	20110224

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

E21B41/00 F04B17/00 Y10T29/49236

European: E21B41/00 F04B17/00
US: 166/101 166/65.1 29/888.02 29/888.020S 417/405 417/405P



Family:

Publication number	Publication date	Application number	Application date
EP2354444 A2	20110810	EP20100196909	20101223
EP2354444 A3	20150527	EP20100196909	20101223
EP2354444 B1	20181121	EP20100196909	20101223
US2011164999 AA	20110707	US20100651627	20100104
US2014332202 AA	20141113	US20140338263	20140722
US10208558 BB	20190219	US20140338263	20140722

Priority:

US20100651627 20100104 US20140338263 20140722

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): MEEK DALE ; PRAD RES AND DEV LTD ; PRAD RES AND DEVELOPMENT LTD ; SERVICES PETROLIERS SCHLUMBERGER ; SCHLUMBERGER SERVICES PETROL ; SCHLUMBERGER HOLDINGS LTD SHL ; SCHLUMBERGER TECHNOLOGY BV ; SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): SCHLUMBERGER HOLDINGS LIMITED SHL ; SCHLUMBERGER TECHNOLOGY B V ; SCHLUMBERGER HOLDINGS SHL LTD ; PRAD RESEARCH AND DEVELOPMENT LIMITED ; PRAD RESEARCH AND DEVELOPMENT LTD

Inventor(s): (std): MEEK DALE ; QUAM ERIK

Agent(s): GILES ASHLEY SIMON; SCHLUMBERGER INTELLECTUAL PROPERTY DEPARTMENT

Designated states: AL AT BA BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR

16) Family number: 49092804 (US2011139508A)

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Title: GAUGE PADS, CUTTERS, ROTARY COMPONENTS, AND METHODS FOR DIRECTIONAL DRILLING

Abstract: The present invention recites a method, system and apparatus, wherein said method, system and apparatus comprises a gauge pad for a rotary component received within a borehole, the gauge pad comprising an exterior surface dimensioned for rotation in close proximity to the borehole, a pocket extending through the exterior surface, the pocket in fluid communication with a pressurized fluid source, and wherein the exterior surface is dimensioned such that when a pressurized fluid is discharged through the pocket, the velocity of the fluid through a gap between the exterior surface and borehole creates a pressure drop sufficient to pull the rotary component toward the gauge pad.

Classifications:

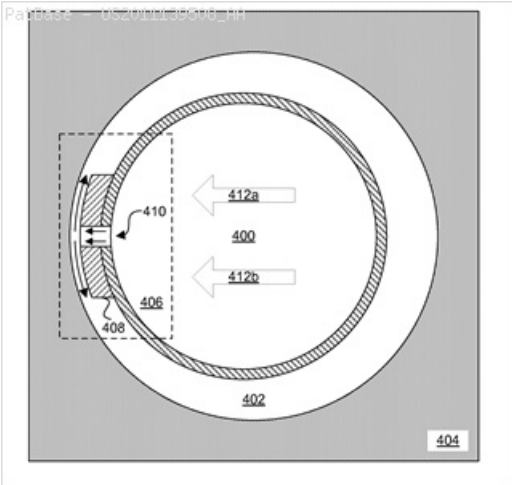
International (IPC 8-9): E21B47/08 E21B7/04

E21B7/08 (Advanced/Invention)

CPC: E21B7/06 E21B7/067 E21B10/00 E21B10/26

European: E21B10/00 E21B10/26 E21B7/06 E21B7/06K

US: 175/393 175/50 175/50P 175/61 175/61S



Family:

Publication number	Publication date	Application number	Application date
US2011139508 AA	20110616	US20090635875	20091211
US8235145 BB	20120807	US20090635875	20091211

Priority:

US20090635875 20091211

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): ALDRED WALTER DAVID ; BARRETT MICHAEL P ; BOUALLEG RIADH ; DOWNTON GEOFFREY C ; ESPINOSA FRANK F ; JOHNSON ASHLEY ; HAUGVALDSTAD KJELL ; JEFFRYES BENJAMIN P ; SCHLUMBERGER TECHNOLOGY CORP

Inventor(s): (std): DOWNTON GEOFFREY C ; JOHNSON ASHLEY ; ALDRED WALTER DAVID ; BARRETT MICHAEL P ; HAUGVALDSTAD KJELL ; JEFFRYES BENJAMIN P ; ESPINOSA FRANK F ; BOUALLEG RIADH

Agent(s): JEREMY P

17) Family number: 49092836 (US2011139512A)

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Title: ACTUATORS, ACTUATABLE JOINTS, AND METHODS OF DIRECTIONAL DRILLING

Abstract: The present invention recites a method and apparatus, wherein said methods and apparatus comprises an actuator comprising a first plate, a pocket extending through the first plate, the pocket in fluid communication with a pressurized fluid source and a second plate coupled to a component that is to be actuated, wherein the first plate, the second plate, and the pocket are dimensioned such that when a pressurized fluid is discharged through the pocket, the velocity of the fluid through a gap between the first plate and the second plate creates a pressure drop sufficient to pull the second plate toward the first plate.

Classifications:

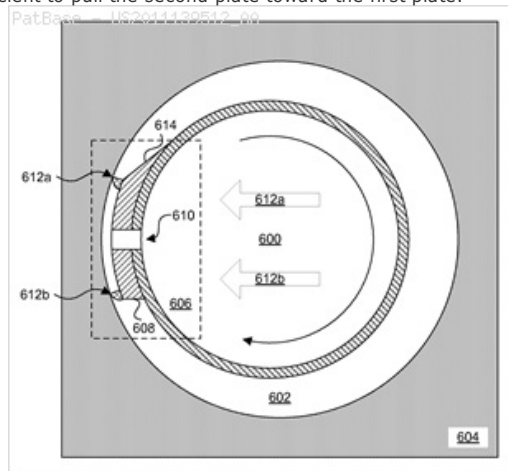
International (IPC 8-9): E21B7/04 E21B7/08

F15B11/08 (Advanced/Invention)

CPC: E21B7/067 F15B15/08

European: E21B7/06K F15B15/08

US: 175/61 175/61P 175/74 60/325 60/325S 60/407 60/407S



Family:

Publication number	Publication date	Application number	Application date
US2011139512 AA	20110616	US20090635880	20091211
US8235146 BB	20120807	US20090635880	20091211

Priority:

US20090635880 20091211

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): ALDRED WALTER DAVID ; BARRETT MICHAEL PAUL ; BOUALLEG RIADH ; DOWNTON GEOFFREY C ; ESPINOSA FRANK F ; JOHNSON ASHLEY ; JEFFRYES BENJAMIN ; HAUGVALDSTAD KJELL ; SCHLUMBERGER TECHNOLOGY CORP

Inventor(s): (std): DOWNTON GEOFFREY C ; BARRETT MICHAEL PAUL ; JOHNSON ASHLEY ; ALDRED WALTER DAVID ; JEFFRYES BENJAMIN ; HAUGVALDSTAD KJELL ; ESPINOSA FRANK F ; BOUALLEG RIADH

Agent(s): JEREMY

18) Family number: 48740946 (US2012279702A)

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Title: FORMATION TESTING

Abstract: An example downhole tool configured for conveyance in a wellbore extending into a subterranean formation comprises a first fluid communicator configured to allow drilling fluid communication with an annulus between the downhole tool and the wellbore, a second fluid communicator configured to direct formation fluid to the annulus, and a formation testing device disposed deeper in the wellbore relative to the first fluid communicator and configured to pump formation fluid from the formation to the second fluid communicator. At least one of the first and second fluid communicators comprises a jet pump.

Classifications:

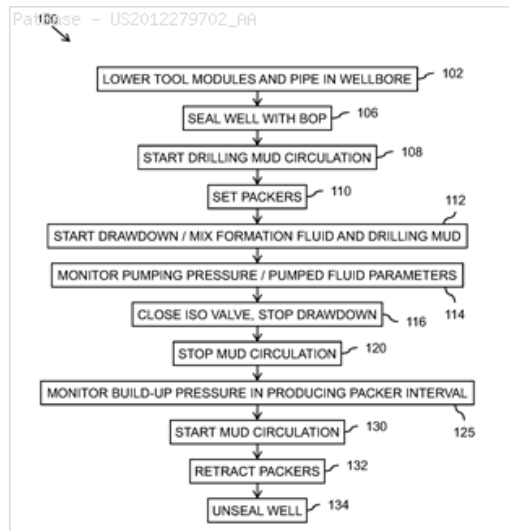
International (IPC 8-9): E21B33/124 E21B43/00 E21B43/14 E21B47/00

E21B49/08 (Advanced/Invention)

CPC: E21B49/08 E21B33/1243

European: E21B33/124B E21B49/08

US: 166/105 166/250.03 166/264 166/336 175/50



Family:

Publication number	Publication date	Application number	Application date
EP2486237 A2	20120815	EP20100822401	20100909
EP2486237 A4	20170426	EP20100822401	20100909
US2012279702 AA	20121108	US20100500422	20100909
US8985218 BB	20150324	US20100500422	20100909
WO11043890 A2	20110414	WO2010US48271	20100909
WO11043890 A3	20110603	WO2010US48271	20100909

Priority:

US20090248721P 20091005 US20100500422 20100909 WO2010US48271 20100909

Probable Assignee: SCHLUMBERGER TECHNOLOGY CORP

Assignee(s): (std): BEDOQUET SYLVAIN ; PRAD RES AND DEV LTD ; QUAM ERIK ; SCHLUMBERGER SERVICES PETROL ; SCHLUMBERGER HOLDINGS ; SCHLUMBERGER CA LTD ; SCHLUMBERGER TECHNOLOGY BV ; SCHLUMBERGER TECHNOLOGY CORP ; SERVICES PETROLIERS SCHLUMBERGER

Assignee(s): SCHLUMBERGER CANADA LTD ; SCHLUMBERGER HOLDINGS LTD ; SCHLUMBERGER HOLDINGS LIMITED ; SCHLUMBERGER CANADA LIMITED ; SCHLUMBERGER TECHNOLOGY B V ; PRAD RESEARCH AND DEVELOPMENT LIMITED ; PRAD RESEARCH AND DEVELOPMENT LTD

Inventor(s): (std): BEDOQUET SYLVAIN ; QUAM ERIK

Agent(s): FORD MICHAEL FREDERICK; KENNETH L; FONSECA DARLA ET AL

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PE PG PH PL PT RO RS RU SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

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Title: OILFIELD OPERATION USING A DRILL STRING

Abstract: Collecting temperature data at a plurality of locations along a wellbore, performing thermo-mechanical simulations of a drill string in response to mud circulation wherein the drill string comprises a tool string suspended in the wellbore from a pipe string, determining changes in length of the pipe string due to temperature changes, positionally fixing the tool string at one of the locations, and adjusting the length of the pipe string based on the determined change in length of the pipe string. Positionally fixing the tool string may comprise lowering the drill string a side entry sub of the drill string is proximate a top end of the wellbore wherein the side entry sub is configured to allow a wireline cable to enter a bore of the drill string, positioning the side entry sub above a blow-out-preventer, and closing the blow-out-preventer around the drill string below the side entry sub.

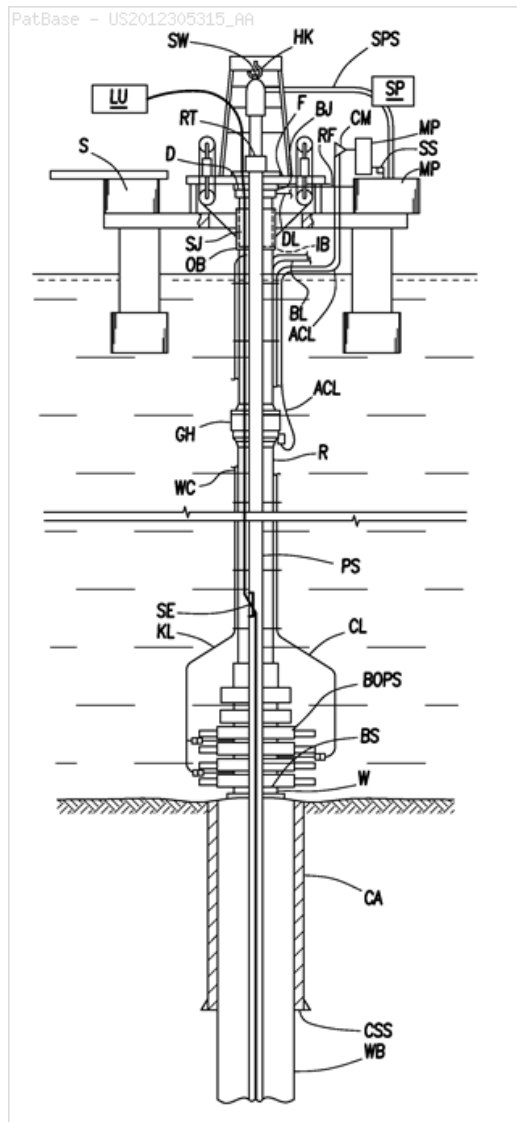
Classifications:

International (IPC 8-9): E21B17/00 E21B17/02 E21B17/07 E21B19/00 E21B21/08 E21B33/06 E21B33/076 E21B33/124 E21B44/00 E21B47/06 E21B47/07 E21B49/00 (Advanced/Invention)

CPC: E21B49/001 E21B33/076 E21B49/00 E21B47/06 E21B33/124 E21B47/065 E21B17/07 E21B17/025

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Family:

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US2012305315 AA	20121206	US20100500117	20101004
US2016123140 AA	20160505	US20160994064	20160112
US9238961 BB	20160119	US20100500117	20101004
US10087752 BB	20181002	US20160994064	20160112
WO11044028 A2	20110414	WO2010US51292	20101004
WO11044028 A3	20110707	WO2010US51292	20101004

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Abstract: Downhole tools are provided for measuring the inclination of a portion of a drill string. In certain embodiments, downhole tools for measuring inclination comprise a catch system for measuring inclination and a pressure pulse signaling system for communicating inclination measurement information to the surface. Catch systems for measuring inclination include a series of disc mounted on an upper shaft, each disc having a ball disposed thereon.

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G01C9/10 G1C9/10 (Advanced/Invention)

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E21B47/024

European: E21B47/022 G01C9/10

US: 33/302 33/304



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CA2736398 AA	20110307	CA20102736398	20100817
US2012279076 AA	20121108	US20100057269	20100817
US2014026428 AA	20140130	US20130021060	20130909
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WO11022416 A1	20110224	WO20100545781	20100817

US20090234426P 20090817	US20100057269 20100817	WO2010US45781 20100817
US20110057269 20110603	US20130021060 20130909	

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Inventor(s): (std): BARNES MATTHEW J

Agent(s): FINLAYSON AND SINGLEHURST; JACKSON WALKER LLP; BUKOYE ABIMBOLA O ET AL

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